

Roll No

MCIT-101

M.E./M.Tech. I Semester

Examination, June 2016

Mathematical Foundation for Information Technology

Time : Three Hours

Maximum Marks: 70

Note : Attempt any five questions. All questions carry equal marks.

1. a) Write short notes on :
 - i) Uncertainty
 - ii) Channel coding
- b) Show that mutual information of a channel is symmetric.
2. a) Write short notes on:
 - i) Channel mutual information capacity
 - ii) Hamming codes
 - iii) Tree codes
- b) The generator polynomial of a (7, 4) cyclic code is $g(x) = 1+x+x^2$. Find all the code words of this code.
3. a) Describe the concept of fuzzy set.
- b) Write short notes on:
 - i) Hamming and Lee matrices
 - ii) Types of codes

4. a) Solve the initial value problem $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0)=1$ for $x = 0.1$ by euler's method.
- b) Explain error correcting and detecting code.
5. a) Let $X = \{(x_1, x_2, x_3, x_4)\}$ and two fuzzy set A and B are
 $A = \{(x_1, 0.2), (x_2, 0.5), (x_3, 0.7), (x_4, 1)\}$
 $B = \{(x_1, 0.6), (x_2, 1), (x_3, 4), (x_4, 0.3)\}$
find $A \cup B$ and $A \cap B$.
- b) Write a note on wavelet transform and its application.
6. a) Find mean and variance of the Binomial distribution.
- b) Explain fuzzy reasoning and extension principle.
7. a) Find the Fourier transform of $e^{-x^2/2}$.
- b) Calculate the 4 point DFT of $F(x) = \{1, 1, 0, 0\}$.
8. a) A problem in mathematics is given to three students, whose chances of solving the problem are $1/2, 1/3, 1/4$. What is the probability that the problem is solved?
- b) Find the Fourier transform of
 $f(x) = x; 0 < x < a$
 $= 0; \text{ otherwise}$
